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Which individual, social and environmental influences shape key phases in the amphetamine type stimulant use trajectory? A systematic narrative review and thematic synthesis of the qualitative literature

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ABSTRACT

Background and aims There is limited evidence on what shapes amphetamine-type stimulant (ATS) use trajectories. This systematic narrative review and qualitative synthesis aimed to identify individual, social and environmental influences shaping key phases in the ATS use trajectory: initiation, continuation, increase/relapse and decrease/abstinence. **Methods** MEDLINE, PsycINFO, EMBASE, and PROQUEST (social science premium collection) were searched from 2000 to 2018. Studies of any qualitative design were eligible for inclusion. Extracted data were analysed according to four key phases within drug pathways, and then cross-analysed for individual, social and environmental influences. **Results** Forty-four papers based on 39 unique studies were included, reporting the views of 1879 ATS users. Participants were aged 14–58 years, from varied socio-economic and demographic groups, and located in North America, Europe, Australasia and South East Asia. Reasons for initiation included: to boost performance at work and in sexual relationships, promote a sense of social 'belonging' and help manage stress. Similar reasons motivated continued use, combined with the challenge of managing withdrawal effects in long-term users. Increased tolerance and/or experiencing a critical life event contributed to an increase in use. Reasons for decrease focused on: increased awareness of the negative health impacts of long-term use, disconnecting from social networks or relationships and financial instability. **Conclusions** Amphetamine-type stimulant users are a highly diverse population, and their drug use careers are shaped by a complex dynamic of individual, social and environmental factors. Tailored, joined-up interventions are needed to address users' overlapping economic, health and social care needs in order to support long-term abstinence.

Keywords Amphetamine-related disorders, amphetamine-type stimulants, drug use trajectory, life course, qualitative synthesis, systematic review.

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INTRODUCTION

Amphetamine-type stimulants (ATS), such as amphetamine, methamphetamine and 3,4-methylenedioxymethamphetamine (MDMA or ecstasy), are the second most commonly used class of illicit drugs globally [1]. A decline in levels of use reported at the start of this decade in some regions of the world has been reversed in recent years, with a pronounced increase in East and South East Asia [2]. The United Nations Office of Drugs and Crime report that world-wide quantities of ATS seized doubled between 2010 and 2015, with methamphetamine accounting for 61–80% [2]. Alongside more traditional ATS, there has also been a rise in the number of stimulant-type novel psychoactive substances (NPS) in global drug markets, including synthetic cathinones such as benzylpiperazine (BZP) and mephedrone [3]. Increasing rates of methylphenidate (MPH) abuse have also been reported, often by students seeking to enhance their cognitive performance [4–6].

Methamphetamine use at dependent levels is associated with multiple comorbidities, including HIV infection, hepatitis, cardiac effects, cognitive dysfunction and prominent psychiatric consequences, such as psychosis [7,8]. Although MDMA is often viewed as a recreational drug, prolonged use is associated with neurological dysfunction and depression [9]. Additional societal costs identified with ATS abuse include premature death, crime, lost productivity, environmental damage, disruption of family life and infectious disease [7,10,11]. However, few treatment options exist [12]. There is currently no effective pharmacotherapy for methamphetamine- or amphetamine-type stimulant dependency [13]. While there is some evidence of efficacy for psychosocial therapies [14–16], their real-world impact has been limited by poor retention rates and treatment adherence among ATS users [17], with high rates of relapse [18]. Given the adverse and often irreversible impacts of repeated ATS use, with early age of onset recognized as one of the best predictors of future substance abuse and dependence [12], prevention is also key. However, again, few effective preventative intervention options exist [19,20].

Complex and inter-related factors contribute to both an individual's drug use, and their capacity to engage with, and benefit from, preventive advice and/or treatment [21,22]. In contrast to epidemiological methods or effectiveness studies, qualitative research allows us to explore the attitudes and experiences that shape substance users' behaviour at key moments of change (phases), while recognizing that these practices are embedded within a specific socio-cultural space and time [23,24]. Such knowledge is critical to the development of more effective prevention and treatment for problem ATS use [25], not least as there is evidence that interventions are more likely to be effective when individuals feel positive about and satisfied with the support that they receive [26]. This review aimed to synthesize qualitative data to understand which individual, social and environmental influences shape critical phases in ATS users' drug careers [27–29].

The protocol was registered and published in PROSPERO (www.crd.york.ac.uk/PROSPERO/, Ref: CRD42016050700).

METHODS

Search strategy

We searched MEDLINE, PsycINFO, EMBASE and PROQUEST (social science premium collection) for peer-reviewed qualitative studies (including the qualitative elements of mixed methods research) conducted in any setting which explored the views of ATS users aged 13+ on which factors have shaped their drug use careers. Due to the rapidly changing ATS drug scene [2], we focused on literature published from 1 January 2000 to 13 March 2018 (see Table 1 for detailed inclusion and exclusion criteria). The search strategy was split into five core concepts in accordance with the SPIDER tool (Sample, Phenomenon of Interest, Design, Evaluation and Research type) (see Table 2) [30]. Terms were coupled with relevant MeSH/thesaurus terms and truncated as appropriate, with variant spellings used. In acknowledgement of the difficulty of identifying relevant qualitative research [31], we also hand-searched selected journals, reviewed relevant websites and checked the reference lists of included studies.

Search results were downloaded to a bibliographic software program (EndNote X7) and de-duplicated. Titles and abstracts were screened independently and full texts then similarly reviewed to identify eligible studies. Any disagreements were resolved by discussion or in consultation with another team member. A structured data abstraction form was used to capture: bibliographic details; design and methodology; aim and objectives; and summary findings.

Quality assessment

Included literature were quality assessed using the Critical Appraisal Skills Programme (CASP) Research Checklist [32], which evaluates studies on the basis of: (1) clarity of research aims; (2) appropriateness of qualitative

Table 1 Inclusion and exclusion criteria.

Inclusion criteria	
Study type:	Any qualitative design including: ethnographies; phenomenological or grounded theory-based studies; participatory action research; and the qualitative elements of mixed methods studies
Participants:	ATS users aged 13 years and over
Setting:	Any setting
Focus of studies:	Views and experiences of ATS users on which factors have shaped their drug use careers
Publication date:	Studies published from 2000 onwards
Exclusion criteria	
• Studies that used structured questionnaires as the sole method of data collection.	
• Studies that focus on polysubstance use unless ATS relevant data could be accessed.	

ATS = amphetamine-type stimulant.

Table 2 Search strategy.

SPIDER concept	*Search terms*
S - Sample: sdult and adolescent ATS users	Amphetamine sulphate OR 3,4-Methylenedioxymethamphetamine OR Methylamphetamine OR Crystal Methylamphetamine OR Crystal Meth OR Mephedrone OR Cathinone OR MDMA OR Ecstasy OR stimulant* OR Amphetamine OR legal high OR novel psychoactive substance OR NPS OR Ritalin
PI - Phenomenon of interest: pathways of stimulant use over the life course	Life course OR turning point OR trajectory OR life event OR pathway OR transition OR recovery OR drug career* OR maturing out OR trigger OR desistance OR route* in OR route* out OR treatment OR drug services or milestone* OR change OR decreas* OR increas* OR initiat*
D - Design: qualitative research	Interview OR grounded theory OR ethnography OR interpretative phenomenological analysis OR phenomenology OR focus group OR content analysis OR thematic analysis OR constant comparative OR participant observation
E - Evaluation: experience	perceive OR perception OR perspective OR view OR experience OR attitude OR belief OR opinion OR feel OR know OR understand
R - Research type: qualitative and mixed methods	Qualitative OR qualitative analysis OR qualitative research OR mixed methods

ATS = amphetamine-type stimulant.

methodology; (3) appropriateness of research design; (4) appropriateness of the recruitment strategy; (5) data collection method; (6) consideration of researcher–participant relationship: (7) consideration of ethical issues, (8) rigour of data analysis, (9) clarity of findings and (10) overall value, relevance and impact of the research. Yes/no responses to the first nine questions were used to inform a grading system: 0–4 positive responses elicited a low-quality rating; 5–7 a moderate-quality rating; and 8–9 a high-quality rating. Studies were not excluded on the basis of quality, as poor reporting is not necessarily suggestive of poorly conducted research [33], but were retained on the basis of whether they contributed valuable or novel data to the review.

Data synthesis

Data synthesis was based on Thomas and Harden's thematic method [34]. Content was downloaded into qualitative data management software (Nvivo version 10), and line-by-line coding of the meaning and content of each study was conducted independently by two reviewers. Data reported in multiple papers but relating to the same individual study were coded separately to maximize thematic yield. Next, these codes were compared and contrasted by the review team, and a hierarchy of descriptive themes and subthemes was identified. Finally, we returned to the original review question, cross-examining these initial descriptive themes for individual (such as personality traits, beliefs, mental health and resilience), social (such as friends, family and relationships, education and employment) and environmental (such as policy, legislation, physical place and space) factors relating to the critical phases of interest: initiation, continuation, increase/relapse and decrease/abstinence. This approach avoided forcing the evidence into pre-determined categories, and encouraged a reflective and iterative approach to data synthesis.

RESULTS

Thirty-nine individual studies were included, reported in 44 papers, and covering the views of 1879 ATS users [22,24,35–76] (see Fig. 1, Table 3).

Study characteristics

Participants were aged between 14 and 58 years. Six studies (eight papers) included only females [24,35,42,43,53,56,73,74] and eight only males [39,44,45,48,59,64,65,72], five of which focused on men who have sex with men (MSM) [39,48,59,65,72]. Twenty-five included both genders (28 papers) [22,36–38,40,41,46,47,49–52,54,55,57,58,60–63,66–71,75,76]. Methodologies employed included in-depth interviews [22,35,37,38,46–48,50,52–59,61,62,64–73,75], ethnographies [40,45,49,52,63,74], focus groups [45,59,60,72] and documentary analysis [76]. Twenty-three studies (27 papers) originated in North America [22,24,35–38,40–44,47,49,50,54,57,60,63–66,71,73–76], five in Europe (six papers) [39,53,55,58,61,62,69,70], four in Australia [46,48,52,67] and six in South East Asia [45,51,56,59,68,72]. All participants were polysubstance users. Three studies (four papers) focused specifically on NPS use [39,61,62,75]. Six studies (eight papers) examined abuse of prescription medication for conditions such as attention deficit hyperactive disorder (ADHD) [24,38,42–44,52,55,57]. Of the 39 studies quality assessed: two were rated as low- [40,56] due to lack of information about recruitment, ethical considerations and/or findings; 27 moderate- (32 papers) [24,35–39,41,42,44–50,52–54,57–63,65–67,70,71,75,76]; and 10 high-quality [22,43,51,55,64,68,69,72–74].

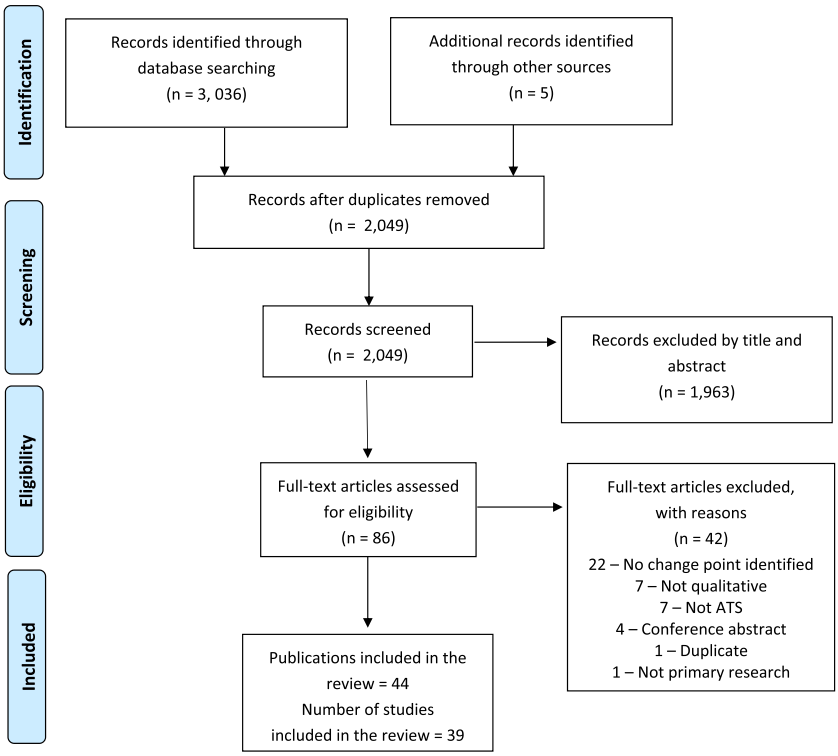

Figure 1 Flow diagram [Colour figure can be viewed at wileyonlinelibrary.com]

Themes by phase and influencing factor

Synthesized data are described narratively below, with the overall coding of themes summarized in Fig. 2. Specific ATS phases, influencing factors and illustrative quotes are provided in Table 4.

Initiation

Individual factors

Fifteen studies (16 papers) identified personal characteristics such as curiosity and propensity for experimentation as influencing the initiation of ATS use [24,40,41,46,47,50,56–58,60,61,65,68–70,75]. Van Hout & Brennan examined mephedrone use in Ireland before the introduction of legislation banning the sale of all psychoactive drugs [69]. They highlighted the potential for individuals open to experimentation and impulsivity to start using ATS, particularly in recreational settings. Sherman *et al.* examined ATS use in rural northern Thailand [68], and also found that curiosity about the effects of ATS spurred on usage, often supported by a hedonistic attitude towards perceived risks. Four studies identified enhancement of sex as a factor in ATS initiation [39,47,56,65], predominantly among MSM communities [39,47,65]

Ten (12 papers) studies identified self-management of mental health and trauma as a factor motivating initiation of ATS, mostly in methamphetamine users [22,24,40,42,49,50,53,60,63,68,71,74]. Early traumatic experiences were found to prompt initiation of ATS use among female inmates in a North American prison [42]. Methamphetamine-addicted mothers reported taking ATS to manage low mood and loneliness, and to boost energy [53]. A further study of methamphetamine use by street-entrenched young adults in Vancouver found that ATS initiation was linked to self-management of depression, anxiety, undiagnosed attention deficit disorder and schizophrenia [49].

Social factors

Family, friendships and intimate relationships with other ATS users was a common social factor contributing to initiation, mentioned by 23 studies (24 papers) [22,24,37,38,40–42,46–48,50,53,57,58,60–65,67–69,71,74]. Initiation of ATS use by dangerous sport enthusiasts helped to cement friendships and facilitate identity formation as a risk taker [58]. Social proximity to drug dealers was also highlighted as encouraging ATS initiation: Von Mayrhauser *et al.* report that a quarter of their participants were introduced to ATS by dealers [71]. However, in Eiserman *et al.*'s study of ecstasy use among young adults in an urban setting, family and friends were more influential [47].

Using ATS, and in particular methamphetamine, to enhance work-place performance was a further common theme, reported in eight studies

Table 3 Study characteristics.

Reference Author (year)	*Study focus*	*Methods*	*Sample size*	*Participant demographics (country; age; gender; ethnicity; socio-economic status; education)*	*ATS and other substance use*	*Quality*
Abdul-Khabir *et al.* (2014) [35]	Experiences of meth-using women in Los Angeles County	Semi-structured interviews	*n* = 30	USA; 21–44 years (mean = 29.7); F = 100%; Hispanic (73%), Caucasian (23%), Asian (3%); NR; some high school (43.4%), high school graduated/GED (20%), Some college/vocational training (36.7%)	Methamphetamine (mean = 10 years; median = 10 years; range = 1–28 years); 2/3 started before age 18	Moderate
Bahora *et al.* (2009) [36]	Perceptions of ecstasy users about recreational and normalized use	Semi-structured interviews	*n* = 112	USA; 18–25 years (median = 20.7); M = 68%, F = 32%; white (54%); NR; high school level (63%)	Ecstasy	Moderate
Boeri *et al.* (2006) [37]	Drug use patterns and social roles of opiate and stimulant use over the life-course	In-depth life history interviews	*n* = 65	USA; median = 41 years; M = 67.7%, F = 32.3%; African American (40%), white (60%); working FT (21.5%), working PT (16.9%), unemployed/ looking (18.5%), unemployed/not looking (21.5%), SSI/disability (13.8%), other (7.7%); less than high school (20%), high school/ GED (20%), college or more (60%)	Heroin (50.8%); methamphetamine (49.2%)	Moderate
Boeri *et al.* (2009) [22]	Trajectories of methamphetamine use in suburban users	In-depth interviews	*n* = 48	USA; 19–56 years (mean = 34.9); F = 20.8%, M = 79.2%; white (85.4%), African American (10.4%), Latino (14.2%); NR; NR	Methamphetamine	High
Boshears *et al.* (2011) [38]	Relational aspects of drug use, drug abuse and addiction	Participant observation, semi-structured interviews, in-depth life histories	*n* = 100	USA; 18–65 years (mean = 34.4); M = 65%; white (84%), with African American [11] and Hispanic/Latino [5]; homeless/unemployed, college students, small business owners; NR	Methamphetamine (100%); marijuana (100%); cocaine (95%); prescription pills (69%); crack (67%); heroin (39%)	Moderate
Bourne *et al.* (2015) [39]	Personal and social context of Chemsex	In-depth interviews	*n* = 30	UK; 21–53 years (mean = 36); M = 100%; white British [16]; white other [8]; black Caribbean [1]; NR; NR	Crystal methamphetamine; mephedrone	Moderate

(*Continues*)

Table 3. (Continued)

Reference Author (year)	*Study focus*	*Methods*	*Sample size*	*Participant demographics (country; age; gender; ethnicity; socio-economic status; education)*	*ATS and other substance use*	*Quality*
Brown (2010) [40]	Impact of local frames of masculinity in Appalachia on the initiation and continuation of meth use in American Indian and white youth	Ethnography, semi-structured interviews	*n* = 49	USA; 19–24 years; M = 26%, F = 23%; American Indian [19], white [30]; NR; NR	Methamphetamine	Low
Bungay *et al.* (2006) [41]	Social context of crystal meth use amongst inner-city, street youth	Semi-structured interviews	*n* = 12	Canada; 16–25 years; M = 5, F = 7; NR; NR; NR	Methamphetamine	Moderate
Carbone-Lopez (2015) [24][a]	Impact of recent changes in methamphetamine-related laws on their use and market behaviour	Semi-structured interviews	*n* = 38	USA; 20–58 years (mean = 32); F = 100%; white (100%); NR; 50% did not complete high school	Polydrug use: marijuana; heroin; crack; cocaine; prescription pills	Moderate
Carbone-Lopez & Miller (2012) [43][a]	Ways in which women articulate their storylines of initiation into meth use	Semi-structured interviews	*n* = 40	USA; 20–58 years (mean = 32); F = 100%; white (100%); NR; 50% did not complete high school	Methamphetamine, prescription pills	High
Carbone-Lopez *et al.* (2012) [42][a]	Impact of early transitions into adult roles and responsibilities on the onset of methamphetamine use	Semi-structured interviews	*n* = 35	USA; 20–58 years (mean = 32); F = 100%; white (100%); NR; 50% did not complete high school	Polydrug use: marijuana; heroin; crack; cocaine; prescription pills	Moderate
Cheney *et al.* (2018) [74]	Methamphetamine use initiation as influenced by Latinas' social positions within institutions (e.g. family and economy).	Participant observation, in-depth interviews	*n* = 19	USA; < 30 years = 68%, ≥ 30 years = 32%; F = 100%; Latina = 89%, other = 11%; welfare = 94%, employment = 6%, probation/parole = 21%; some college = 16%, HS/GED 5 26%, less than HS 11 58%.	methamphetamine; alcohol; other illicit drugs	High
Desantis *et al.* (2010) [44]	Students' levels of understanding and motivations for use of these Schedule II controlled substances	In-depth interviews	*n* = 79	USA; NR; M = 100%; NR; NR; college level	Adderal; Ritalin; speed	High

(*Continues*)

Table 3. (Continued)

Reference Author (year)	*Study focus*	*Methods*	*Sample size*	*Participant demographics (country; age; gender; ethnicity; socio-economic status; education)*	*ATS and other substance use*	*Quality*
Desrosiers *et al.* (2016)	Drug use and treatment needs of people who use drugs (PWUD) in rural areas of Kelantan	Ethnography, qualitative observations, focus groups	*n* = 27	Malaysia; 21–49 years; M = 100%; Malay ethnicity; NR; NR	Methamphetamine	Moderate
Duff and Moore (2015) [46]	Understanding how heavy drug users negotiate power, governmentality and modulations of health and illness in everyday life	Semi-structured interviews	*n* = 31	Australia; 22–56 years (mean = 36); M = 17, F = 13, trans = 1; Anglo/European [2], Australian [26]; employed FT [4], welfare [20]; tertiary institution [4], secondary education [3]	Methamphetamine	Moderate
Eiserman *et al.* (2005) [47]	Ecstasy use among inner city adolescents and young adults	In-depth interviews	*n* = 23	USA; 17–24 years (mean = 21); M = 13, M = 10; African American and Puerto Rican; NR; NR	Polydrug users: ecstasy/MDMA	Moderate
Elliott *et al.* (2018) [75]	Experiences and contexts for synthetic cathinone use	In-depth interviews	*n* = 39	USA; 19–57 years (M = 36); 0%; black/African American = 21/39, Hispanic/Latino = 8%, white = 36%; 26 identified as male, 13 as female; employment = 10/39; mean = under high school diploma	Synthetic cathinones	Moderate
Farrugia (2015) [48]	Enactment of masculinity in young men's drug consumption	Semi-structured interviews	*n* = 25	Australia; 16–19 years; M = 100%; southern European [2], Indian [1]; South African [1]; Australian [21]; hospitality and service roles [3], unemployed [4]; still completing secondary school [12]; tertiary education [5], apprenticeship [1]	MDMA/ecstasy	Moderate
Fast *et al.* (2009) [50][b]	How street-entrenched young people were characterized and understood their initiation into downtown Vancouver drug scene	Semi-structured interviews	*n* = 38	Canada; 14–26 years; F = 18, M = 18, trans = 2; Caucasian (67%), Aboriginal (28%), African Canadian (5%); drug dealing, sex work, theft, panhandling, street performing (busking); NR	Crystal methamphetamine; heroin; cocaine; crack	Moderate

(***Continues***)

Table 3. (Continued)

Reference Author (year)	*Study focus*	*Methods*	*Sample size*	*Participant demographics (country; age; gender; ethnicity; socio-economic status; education)*	*ATS and other substance use*	*Quality*
Fast *et al.* (2014) [49][b]	Youth understandings and experiences of meth use in the context of an urban drug scene	Ethnography, in-depth interviews	*n* = 75	Canada; 14–26 years; M = 38, F = 29 (waves 1 and 2); Caucasian, Aboriginal, African Canadian; Range of illicit income generation activities, including drug dealing [51], sex work [14], theft [27]; graduated high school [15]	Methamphetamine	Moderate
German *et al.* (2006) [51]	Factors influencing cessation intentions among young Thai methamphetamine users	In-depth interviews	*n* = 48	Thailand; 15–31 years (median = 20); M = 57%, F = 43%; NR; current students, labourers but most unemployed; most had completed high school education, minority to college level, remainder had not completed any formal education	Methamphetamine	High
Green (2016) [52]	How 'recreational' styles of drug use were negotiated by young adults in relation to emerging 'adult' identities	Ethnographic analysis, field observations, in-depth interviews	*n* = 60 (25 subset interviews)	Australia; 18–31 years, 21–31 years (interviewees) (mean = 25.4, median = 25); M = 60%, F = 40%; Anglo-Celtic (44%), other (56%); FT employment (*n* = 20); FT plus college (*n* = 3) PT employment only (*n* = 2); completed high school (*n* = 20); university degree (*n* = 12); vocational course (tertiary, non-university, *n* = 9); FT college (*n* = 3)	Methamphetamine; amphetamine, prescription pills	Moderate
Haight *et al.* (2009) [53]	Experience of mothers recovering from methamphetamine addiction	Case-based research, semi-structured interviews	*n* = 4	USA; 30s; F = 100%; white (100%); NR; NR	Methamphetamine; other substances	Moderate

(***Continues***)

Table 3. (Continued)

Reference Author (year)	*Study focus*	*Methods*	*Sample size*	*Participant demographics (country; age; gender; ethnicity; socio-economic status; education)*	*ATS and other substance use*	*Quality*
Herbeck *et al.* (2014) [54]	Methamphetamine use patterns and the process of recovery	Qualitative interviews	*n* = 20	USA; mean = 46.2 years (SD = 9.5); M = 65%, F = 35%; African American (35%), white (35%), Hispanic (25%) and multi-ethnic (5%); NR; NR	Methamphetamine	Moderate
Hildt *et al.* (2014) [55]	Pharmacological academic performance enhancement via prescription and illicit stimulant use (amphetamines, Methylphenidate) among university students into a broader context	Semi-structured interviews	*n* = 22	Germany; mean = 25.8 years (SD = 2.88); M = 66.7%, F = 33.3%; NR; NR; all were students	Prescription stimulants (e.g. Ritalin); amphetamine	High
Ho *et al.* (2013) [56]	ATS use among female sex workers in three major cities and to identify HIV-related sexual risks among this group	In-depth interviews	*n* = 37	Vietnam; 18–43 years (mean = 27); F = 100%; NR; sex work; completed high school (14.3%)	Ecstasy; crystal methamphetamine; ketamine	Low
Kerley *et al.* (2015) [57]	Why do college students use prescription stimulants? How do they make sense of their use within conventional, middle-class focal concerns?	Semi-structured interviews	*n* = 22	USA; 19–24 years; M = 50%; white (68.5%) black (9%) Asian (4.5%) mixed (18%); no regular employment; all FT students	Prescription stimulants (e.g. Adderall)	Moderate
Larkin & Griffiths (2004) [58]	How do people evaluate and understand the relationship between risk and pleasure?	Semi-structured interviews	*n* = 11	UK; 20–late 40s; M = 8, F = 3; NR; NR; NR	Ecstasy	Moderate
Lasco (2014) [59]	Functions of methamphetamine (locally known as shabu) in the economic and social lives of a community of underclass young men in a Philippine port	Semi-structured interviews, focus groups	*n* = 20	Philippines; 18–25 years; mean = 100%; NR; food/beverages vendors and/or sex work; most not completed high school	Methamphetamine (Shabu)	Moderate

(*Continues*)

Table 3. (Continued)

Reference Author (year)	*Study focus*	*Methods*	*Sample size*	*Participant demographics (country; age; gender; ethnicity; socio-economic status; education)*	*ATS and other substance use*	*Quality*
Levy *et al.* (2005) [60]	Ecstasy use in college students	Focus groups	*n* = 30	USA; 18–23 years (mean = 19.5); M = 43%, F = 57%; white (90%), Asian/Pacific (7%), black (3%); NR; all university students	Ecstasy; multiple other illicit substances	Moderate
Loza *et al.* (2016) [73]	Contextual factors that influence the initiation and continued use of methamphetamine by women on the US–Mexico border	Semi-structured interviews	*n* = 20	USA/Mexico; 18+; F = 100%; NR; NR; NR	Methamphetamine; polydrug users	High
McElrath & O'Neill (2011) [61][c]	[1] explore respondents' experiences with mephedrone, [2] examine users' perceptions about the safety of mephedrone, and primarily to [3] examine sources of mephedrone supply during the pre- and post-ban periods	Semi-structured interviews	*n* = 23	Northern Ireland; 19–51 years; F = 52%, M = 48%; NR; 19/23 FT or PT employed; NR	Mephedrone	Moderate
McElrath & Van Hout (2011) [62][c]	Reasons for mephedrone preferences; positive and negative effects; administration routes; and consumers' views about the legality of mephedrone.	Semi-structured interviews	*n* = 45	Republic of Ireland (ROI) and Northern Ireland (NI); 19–51 years (NI) and 18–35 years (ROI); NI (F = 52%, M = 48%) ROI (F = 36%, M = 64%); NR; most FT or PT employed; NR	Mephedrone; cannabis; amphetamine; cocaine; ecstasy; hallucinogens; ketamine; poppers	Moderate

(*Continues*)

Table 3. (Continued)

Reference Author (year)	*Study focus*	*Methods*	*Sample size*	*Participant demographics (country; age; gender; ethnicity; socio-economic status; education)*	*ATS and other substance use*	*Quality*
O'Brien *et al.* (2008) [63]	Examine the development of MA use across users' lives and its impact on their emotional, social, and psychological experiences	Ethnographic interviews	*n* = 13	USA; 20–58 years (mean = 32); M = 7, F = 6; African American (15%), Hispanic (46%), non-Hispanic white (31%), other (8%); NR; most less than high school education; 3 some college education	Methamphetamine; marijuana; crack; cocaine	Moderate
Obong'o *et al.* (2017) [76]	Explore the motivating factors for recovering from methamphetamine abuse	Document analysis	*n* = 202 (documents)	USA; NR; NR; NR; NR; NR	Methamphetamine	Moderate
Ojeda *et al.* (2011) [64]	Illicit drug use behaviours in diverse settings among male IDUs residing in Tijuana, Mexico who self-identified as deportees	Semi-structured interviews	*n* = 24	Mexico; mean = 36.9 years (SD = 7.3); M = 100%; Mexican (100%); NR; NR.	Methamphetamine; heroin	High
Parsons *et al.* (2007) [65]	Contexts in which young gay and bisexual men were first initiated into methamphetamine use	Semi-structured interviews	*n* = 58	USA; mean = 24.9 years (SD = 2.8); M = 100%; white (59.3%), Hispanic/Latino (24.1%), African American/black (7.5%), Asian/Pacific Islander (3.7%), mixed/other (5.6%), FT student (51.9%), PT student (25.9%), PT + FT student (11.1%), unemployed/student (5.6%), unemployed/other (5.6%); some high school/high school diploma/GED (11.2%), some college/associates degree (22.2%), currently enrolled in college (7.4%), 4-year college degree or graduate degree (59.3%)	Methamphetamine; cocaine; ecstasy; ketamine; GHB; LSD; alcohol; cannabis; poppers; crack-cocaine; heroin	Moderate

(*Continues*)

Table 3. (Continued)

Reference Author (year)	*Study focus*	*Methods*	*Sample size*	*Participant demographics (country; age; gender; ethnicity; socio-economic status; education)*	*ATS and other substance use*	*Quality*
Sexton *et al.* (2008) [66]	Trajectories of MA use	Qualitative interviews	*n* = 39 (baseline) *n* = 24 (follow-up)	USA; 18–52 years (mean = 32); M = 11, F = 13 (follow-up); All white apart from 2 African American; NR; NR	Methamphetamine	Moderate
Sheridan *et al.* (2009) [67]	Patterns of meth-amphetamine use and associated harms, and to explore future drug use plans of users and their needs in relation to treatment services	Semi-structured interviews	*n* = 20	New Zealand; 19–52 years (mean = 30.7); F = 12, M = 8; New Zealand European [18], Maori [1], other European [8]; in receipt government grant [8], self-employed [2], homemakers/mothers [3], remainder in various employment; NR	Methamphetamine; cannabis; amphetamine	Moderate
Sherman *et al.* (2008) [68]	Factors associated with MA initiation among older adolescents and young adult drug users in northern Thailand	In-depth interviews	*n* = 48	Northern Thailand; 15–31 years (median = 20); M = 57%; NR; NR; NR	Methamphetamine; glue; alcohol	High
Van Hout & Brennan (2011a) [69]	Mephedrone use in pre-legislation Ireland	Semi-structured interviews	*n* = 22	South East Ireland; 18–35 years; F = 8, M = 14; NR; majority semi-professional and employed, remainder in third-level education; NR	Mephedrone; polydrug users (including inc. alcohol cannabis, ecstasy, cocaine).	High
Van Hout & Brennan (2011b) [70]	Legal psychoactive drug use prior to legislative control in Ireland.	Semi-structured interviews	*n* = 32	Northern Ireland and Republic of Ireland; 18–35 years; M = 20, F = 12; NR; NR; NR.	NPS; other illicit substances	Moderate

(*Continues*)

Table 3. (Continued)

Reference Author (year)	*Study focus*	*Methods*	*Sample size*	*Participant demographics (country; age; gender; ethnicity; socio-economic status; education)*	*ATS and other substance use*	*Quality*
Von Mayrhauser *et al.* (2002) [71]	Who are methamphetamine users and what are the circumstances that surround their drug use?	Semi-structured interviews	*n* = 260	USA; mean = 35 years; M = 142, F = 118; African American [49], Latino [77], white (132); most unemployed at time of interview with experience of illicit employment, inc. sex work and drug dealing; majority had graduated from high school or gone to trade school; minority with college degrees	Methamphetamine; polydrug users, inc. alcohol, cannabis, heroin, crack and cocaine	Moderate
Vu *et al.* (2012) [72]	Patterns of drug use among these population groups and to identify risk factors for engaging in risky behaviours that put them at increased risk for HIV infection	In-depth interviews, focus groups	*n* = 62	Vietnam; 19–41 years (mean = 26.7); M = 100%; migrant (46.8%), resident (53.2%); employed (41.9%), self-employed, (21.0%), unemployed (29.0%), student (8.1%); primary school (8.1%), secondary school (30.6%), high school (48.4%), college and beyond (12.9%)	Heroin; ecstasy; crystal methamphetamine; ketamine; cannabis	High

[a]Carbone-Lopez and Miller (2012); Carobone-Lopez *et al.* (2012) and Carbone-Lopez relate to the same original study [b]Fast *et al.* (2009) and Fast *et al.* (2014) relate to the same original study. [c]McElrath & O'Neill (2011) and McElrath & Van Hout (2011) relate to the same original study. HS = high school; GED = general educational development; SD = standard deviation; MDMA = 3,4-methylenedioxymethamphetamine.

Figure 2 Coding of themes (no. of sources) presented by influencing sphere and critical change point [Colour figure can be viewed at wileyonlinelibrary.com]

[22,37,38,40,56,64,68,71]. Participants in Ojeda *et al.*'s study of Mexican men being deported from the United States used ATS to help them manage exhaustion when working long hours [64]. A similar message emerged in research from Boeri *et al.* examining the trajectories of current and ex-methamphetamine users in a North American suburb [22]. Participants described being encouraged to use ATS by co-workers to increase energy levels. In addition to enhancing performance, Sherman *et al.*'s study in Thailand linked ATS initiation to hunger reduction at work [68].

Environmental factors

Thirteen studies found that frequent exposure to ATS within certain settings triggered use initiation [22,24,37,40,41,45–50,55–59,65–68], particularly house parties and nightclubs [40,58,62–64]. As Bahora *et al.*'s examination of recreational ecstasy use in North America underlines, when ATS are accessible, available and normalized in sociable spaces, likelihood of initiation has been found to increase [36], a finding echoed in a study of stimulant type NPS in Ireland prior to legislative control [61].

Continuation

Individual factors

Sexual enhancement was a key reason for continued methamphetamine use. This relates to boosting sexual pleasure in conventional intimate relationships [71], as well as functional sexual performance and offsetting of associated low mood in both MSM and female sex workers [56,72]. Indeed, coping with ongoing mental health needs was a common theme identified elsewhere [29,42,43,46,47,49,50,57,67,68,70–72,74], particularly among methamphetamine users. For example, Fast *et al.*'s study of street-entrenched young people in Canada reported that many users were self-medicating to manage depression and the stress of living in severely deprived circumstances [49].

Eight studies focused on the link between sustained ATS use and a perception of being in control [22,36,41,49,57–59,67]. Bahora *et al.* found that long-term ecstasy users did not identify any adverse impacts on their day-to-day life and believed that ATS were not addictive [36]. Lasco *et al.* explored ATS use among disadvantaged men in the Philippines and also found that participants described their own use as managed and acceptable, drawing a clear distinction between being an 'addict' and a 'user' [59].

Social factors

Nine studies highlighted the perceived positive impact of continued ATS use on friendships and relationships [36,38,42,47,49,69,74,75], including Farrugia's exploration of how MDMA was used to facilitate a sense of intimacy between young male users [48]. Evidence also emerged of a socially mediated level of ATS use being established, with higher dosages than 'acceptable' within friendship groups being stigmatized [59–61]. Linked to the work performance issue highlighted previously, Bungay *et al.* [41] examined ATS dependency among young adults in urban Canada and found that motivations to continue

Table 4 Influencing spheres, factors and illustrative quotes.

Phase	*Influencing sphere*	*Influencing factor (references)*	*Illustrative quote (gender, age, country) (reference)*
Initiation	Individual	Curiosity and experimentation [24,40,41,46,47,50,56–58,60,61,65,68–70,75]	'I just got curious about it. And then one day I went there (to an underground rave), [and] this dude was asking me if I knew anybody that wanted some ecstasy. I [said], "Yeah me!" and I bought some… and I tried it' (male, 24, USA) [47]
		Sexual enhancement [39,47,56,65]	'I use ice with my boyfriend so that my sex drive increases. After using ice I must have sex, and with ecstasy I feel happy with friends, we listen to music and dance and all that. After dancing I have sexual desire, I also have sex' (female, NR, Vietnam) [56]
		Mental health and trauma [22,24,40,42,49,50,53,60,63,68,71,74]	'I have a lot of depression issues and stuff… I was trying every single drug to see which one would make me happier. Speed for me, it's like a medication' (male, 24, Canada) [49]
	Social	Friends, family and relationships [22,24,38,40–42,46–48,50,53,57,58,60–65,68,69,71,74]	'Well, my parents grew up down here and they're drug addicts so therefore I watched my parents do it all my life, and I started doing drugs when I was like 10 years old' (Kaley, 20, Canada) [50]
		Pressure and performance [22,37,38,40,56,64,68,71]	'We were working, and I guess working overtime, and I was really exhausted, really tired and [a supervisor at work] said: "Here, I got something to make you feel better"' (male, 41, USA) [22]
	Environmental	Space and place [22,37,40,41,45–50,55–59,62–68]	'I went into a house one day. They were, they were doing it. I had no… idea what it was… I mean hard stuff, you know, never seen none of that in my entire life. And there it was laying on the table, and they said—they done what they done in front of me, and then they said, "There's a line. If you want it, you can have it. And if you don't, just leave it there". And [they] got up and left the room' (female, 23, USA) [40]
		Legal status [24,69,70]	'Mephedrone, Charge, Charleeze, Ice Gold. I chose these because they mimic my drugs of choice… They're easier to come by obviously, as all you have to do is walk into a shop and buy them' (female, 28, Ireland) [70]
Continuation	Individual	Sexual enhancement [56,71,72]	'I'm a biker. I have been around crank all my life. I like how it makes me feel sexually. Even after my second heart attack and being diagnosed with diabetes, I still use it for sex' (male, 51, USA) [71]

(***Continues***)

Table 4. (Continued)

Phase	*Influencing sphere*	*Influencing factor (references)*	*Illustrative quote (gender, age, country) (reference)*
		Perception of control [22,36,41,49,57–59,67]	'If you are getting carried away by the drug, that is, if you're working just to have it, then you're an addict. But if you're the one carrying the drug, that is, if you're taking it so you can be more productive, then you're not an addict' (male, NR, Philippines) [59]
		Mental health and trauma [29,42,43,46,47,49,50,56,57,67,68,70–72,74]	'I think being on speed balances me out. It's like an antidepressant for me, makes me feel like other people. I really think I'm missing something in my brain and the speed makes me normal' (male, NR, Australia) [46]
	Social	Friends, family and relationships [36,38,42,47–49,59–61,69,74,75]	'You just get lot more intimate, so you talk about deeper things rather than just your everyday conversation about what happened or what has happened, get into, like, deep talks and opinions and all that sort of stuff' (male, 18, Australia) [48]
		Pressure and performance [41]	'You're managing to get 20 times what everybody else is doing done… You know you're pretty proud of yourself. It's just like a sense of being somebody' (NR, NR, Canada) [41]
	Environmental	Social and economic exclusion [43,50]	'Me and my friend, we used to come downtown to like pick up [buy drugs]. And we'd just like walk around. I liked it downtown better' (female, 19, Canada) [50]
		Space and place [56,60]	'You have to use ice in a guest house or a private home. And ecstasy, you always need music, you can't use ecstasy without it' (female, NR, Philippines) [56]
		Legal status [36,61,62,70]	'It wasn't that I thought it was safe, but you could buy it in bulk, legally. It was easy to get, and it was cheap' (female, 19, Northern Ireland) [62]
Increase and relapse	Individual	Losing control of dosage [22,47,53]	'It (methamphetamine) became an obsession for me, I was always looking for... different pipes... I built my own bongs, you know, to smoke it out of. It was sick. ... Ahhh, it got out of control, fast... you're extremely paranoid when you're on meth, extremely paranoid. You live in a fog… You don't think clearly. You don't think rationally. You don't think rationally about anything' (female, NR, USA) [53]
		Mental health and trauma [22,46,63]	'I go through times when I try to get off it [meth] but then I do feel quite normal on it. But without it I don't. So I think being on speed balances me out. It's like an antidepressant for me, makes me feel like other people' (female, NR, Australia) [46]

(*Continues*)

Table 4. (Continued)

Phase	*Influencing sphere*	*Influencing factor (references)*	*Illustrative quote (gender, age, country) (reference)*
		Detoxification and reward [22,41]	'Sometimes, I don't do it for a couple of days to catch up on my sleep and get healthy. If detox doesn't have a bed, I self-detox. Not having people around, having steady food and just being basically able to chill. I just sleep for two days and then I eat for a day and then I recognize myself in the mirror again' (NR, NR, Canada) [41]
	Social	Friends, family and relationships [22,38,50,51,73]	'You know, it seemed like during the bad times maybe the usage would pick up. Like after a relationship split up, or divorce, or something like that' (male, 54, USA) [22]
		Pressure and performance [22,44,51,57,71]	'I was falling behind in my bills. I wanted to work. I wanted to keep up. I was running my company and... It was really hard. Life's hard when you work for yourself. The day doesn't stop at 5 o'clock' (male, 41, USA) [22]
	Environmental	Social and economic exclusion [41,49,63,64]	'I had lost my job, my brother's company, and everything. Well, when I was here in Tijuana, I had to come to terms with what's done is done, and there is nothing left to do' (male, 47, USA) [64]
Decrease and abstinence	Individual	Physical and mental health [30,40,41,47,49–51,54,55,60,61,64,66,76]	'I have a hole in my brain now. I'm manic bipolar, I'm paranoid as fuck, and it's all because of meth and I know a lot of people that have just completely lost their minds, and can't even string a sentence of words together that you can understand, you know? I loved it for years. I loved it more than anything. And then I started to notice [pause] downsides' (male, 20, Canada) [49]
		Willpower and self-awareness [22,41,45,47,49,51,54,56,76]	'I'm a very strong-minded person because I just stopped cold turkey and most people cannot do that. I just decided it was stupid for me to be not only ruining my health, but ultimately it was going to ruin my life...' (female, 21, USA) [22]
		Personal experience of negative effects [60]	'The more you do it the less good you feel while on it and the worse you feel coming down' (NR, NR, USA) [60]
	Social	Relationship breakdown [22]	'My wife gave me a talk. She was about to leave, you know, and I really just, I had my son then and I didn't want to lose my family' (male, 26, USA) [22]
		Proximity to ATS-related death [40]	

(*Continues*)

Table 4. (Continued)

Phase	*Influencing sphere*	*Influencing factor (references)*	*Illustrative quote (gender, age, country) (reference)*
			'And his death, it opened a lot of eyes. It opened my eyes. I mean, it tore me up, because I don't want to see that. I mean, I done seen my Grandma going the year before that, seen my uncle 3 years before that, and I just didn't want a—I told myself I wasn't going to another funeral [...] I don't know. It was like—it opened my eyes, and turned my life into something good instead of something bad. And, well that's what I did. I mean, I got off alcohol. I got off drugs. I got off everything' (male, 22, USA) [40]
		Intervention by family or friends [51,52]	'The first time, my mother took me here. I knew nothing so I could stay here just only ten days and asked my mother to go back home. But this time, I asked my father to come and I really want to quit drug' (male, 21, Thailand) [51]
		Changing social networks [38,39,63,66]	'I don't go around my old crowd. I try to stay around my family, or work. I've been going to church, and going to my counselling meetings' (male, 26 USA) [66]
		Gaining licit employment [59,66]	'I have a job. When I'm not working, I try to go out and mow the lawn or mow my Grandma's yard. I've picked up hobbies. I go fishing and stuff like that. I mean really it's really just to keep my mind (male, 20, USA) [66]
	Environmental	Legal status [60]	'The potential risks were too great for me to keep using' (NR, NR, USA) [60]
		Incarceration [53]	'If I hadn't been taken away from it and put in prison for 9 months... I would have been right back on it... I was one of the lucky ones. I got f orced to go to prison. And, right away I got into drug rehab' (female, NR, USA) [53]

use related to improved focus, particularly when committing acquisitive crime [41].

Environmental factors

Two studies found that street-entrenched and homeless participants reported continued ATS use because of their exclusion from more mainstream opportunity structures such as stable housing, education and employment [50,60]. Normalized ATS use in certain spaces and places such as US college campuses [60], clubs and guest houses [56] also contributed to continued consumption. Ambiguity around the legal status of stimulant-type NPS also led to their sustained use, fuelled by a perception of the reliable effects they produced [70].

Increase/relapse

Individual factors

A desire for heightened effects was identified as contributing to an increase in ATS use by both Boeri *et al.* [22] and Eiserman *et al.* [47]. Loss of control of dosage and frequency of methamphetamine-taking was cited by Haight *et al.* as linked to increased use [53]. O'Brien *et al.* highlight how such an increase often became part of a cycle of addiction that users found difficult to extricate themselves from, particularly when their mental health and familial relationships had deteriorated [63]. Similarly, Boeri *et al.* [22] reported that several critical events such unemployment, loss of a relationship and lack of social support, could coalesce, prompting an increase in methamphetamine use, and subsequently a loss of control over dosage and frequency [22].

Duff & Moore (2015) found that participants were reluctant to stop ATS use altogether because of persisting mental health problems, underpinned by a belief that methamphetamine helped stabilize mood or feelings [46]. In Boeri *et al.*'s US-based study, relapse after a period of abstinence was posited as a 'reward' for good behaviour [22]. Bungay *et al.* also report that temporary desistance from ATS for health and/or aesthetic reasons was framed as a short period of 'detoxification' by some users, with consumption resumed once health or desired weight was restored [41].

Social factors

Increased ATS use was also linked to social pressures. For example, Fast *et al.* found that some street-entrenched young adults wanted to avoid being stigmatized as a casual, inexperienced user ('weekend warrior') and so increased their usage to boost their social status [50]. They also found that people who had recently become homeless reported rapid, intense ATS use as a way of socially integrating with established networks. Loza *et al.* found that ATS escalation became a practice which spread among social networks of women [73].

Work- and education-related factors also contributed to increased ATS use. Von Mayrhauser *et al.* found that work instability could motivate an escalation in use [71]; a point echoed in studies from Boeri *et al.* [22] and German *et al.* [51], alongside the impact of longer working hours. Desantis *et al.*'s [44] research into the impact of ATS on American students found that as they reached their final years, existing users would be more likely to escalate their ATS use as a means of coping with increased stress around exams and workload [44] (a point reiterated by Kerley *et al.* [57]). Three studies highlighted reconnecting to a former drug-using network as contributing to relapse [22,38,51].

Environmental factors

Environmental and ecological stressors, such as unstable housing, food and finances, were highlighted by O'Brien *et al.* as causing increased ATS use [63]. Fast *et al.* focused on the adverse impact of welfare withdrawal on deprivation and disadvantage which, in turn, led to escalating ATS use [49]. Bungay *et al.* found that a return to homelessness would lead to additional stressors, meaning that ex-users would frequently relapse to cope with their situation [41].

Desistance/abstinence

Individual factors

A concern about physical and mental health was reported as a factor stimulating desistence in fourteen studies [30,40,41,47,50,51,54,55,60,61,64,66]. Fast *et al.* found that the negative impact of heavy ATS use on cognitive abilities, as well as increased paranoia and deterioration of physical appearance, motivated participants to seek treatment [49]. Personal qualities such as willpower and self-awareness were cited as further factors supporting desistance in nine other studies [22,41,45,47,49,51,54,56,76], as well as having experienced negative effects from using poor quality ATS [65].

Social factors

Families and relationships could support or prompt desistence in various ways. For example, Boeri *et al.* found that the imminent threat of relationship breakdown prompted ATS users to cease consumption [22]. Proximity to an ATS-related death also emerged as a strong deterrent in a study by Brown *et al.* [40]. More positively, both Green *et al.* and German *et al.* found that the intervention of non-using friends played an important part in helping ATS users to abstain and in some cases seek treatment [51,52].

Changing or extricating themselves from particular social networks also appeared to support longer-term ATS

abstention [38,39,63,66]. This also applied to the workplace, as Lasco *et al.*'s study of young, disadvantaged male ATS users in the Philippines found: some participants were able to decrease or abstain from ATS usage as a result of gaining licit employment, which provided routine and respectability [59]. Similarly, Sexton *et al.* also highlight the positive impact of licit employment on reduced ATS use [66].

Environmental factors

A change in the legal status of ATS, particularly NPS, led to desistence in a number of individuals in order to avoid incurring a criminal sanction [60]. Haight *et al.* also report that imprisonment could have a positive impact on some users' capacity to desist from ATS use [53]. However, it was unclear whether this pattern was maintained outside of the prison environment.

DISCUSSION

This qualitative systematic review identified critical turning points on the ATS use trajectory [78]. We found a particularly rich literature describing accounts of initiation, but less evidence on increasing or decreasing ATS use. Throughout all turning points, family, friends and social networks played a central role, facilitating users' initial access, as well as helping to normalize ATS consumption over time. We also found that common individual, social and ecological stressors contributed to changes in the trajectory of ATS use [79]. Experiencing mental health problems, relationship breakdown and social and economic exclusion were strong themes at most time-points, with a number of users experiencing such issues contemporaneously.

The relationship between mental health and ATS use is complex. Experiencing stress, anxiety and/or depression emerged as clear risk factors for ATS initiation, especially methamphetamine, as well as making it more difficult for users to stop or reduce their consumption, an issue highlighted in previous research [77,80]. Epidemiological evidence also confirms that psychostimulants are more likely to induce psychosis than other illicit substances [81], with depression, anxiety and suicidal ideation commonly co-occurring among methamphetamine users [82]. However, it is also important to stress that the majority of participants in the included studies were polysubstance users, often consuming a variety of ATS alongside other substances such as opioids and alcohol. Whether cause or effect, the consequences for people experiencing comorbid ATS use and mental health conditions are profound, adversely affecting responses to treatment and its outcomes [83–85].

ATS users are a highly diverse population, with study participants encompassing students in higher education, women carers and those in full-time work, as well as highly marginalized groups such as sex workers, the unemployed and homeless people [83]. The available data limited our ability to identify trends within specific ATS user groups. However, methamphetamine use was common among the most socially excluded communities [22,38,41,49,50]. While 59% of studies were from the United States (including all those examining misuse of prescription stimulants), ATS use was global, and some commonalities emerged. For example, boredom in rural areas was seen as a factor contributing to ATS initiation in both young men living in both South East Asia [45,51,59,68,72] and North America [40]. However, there were also some notable differences. Accounts of ATS initiation in South East Asia focused on functional methamphetamine use, to cope with the demands of high-risk, often illicit employment, particularly sex work [56,59,72]. In contrast, all the studies that explored recreational ATS use, mostly ecstasy and NPS within the club scene, were based in North America [36] Europe [58,62,69] or Australia [52].

To our knowledge, this is the first review of international qualitative literature on ATS use trajectories. As such, it responds to an identified gap in the empirical evidence base on what shapes the course of ATS use over time [86]. A strength of our review is the diverse and comprehensive nature of the included studies, covering a variety of geographic, social and economic contexts, different drug use practices and a range of user populations. However, our findings are limited by the quality of the available literature, with the majority of included papers deemed of moderate quality. We chose to retain two papers classed as of low quality in our synthesis, as despite the lack of detail on recruitment, ethics and researcher-reflexivity, the studies provided valuable data on particularly marginalized ATS user populations in the case of Ho's study of female sex workers [56], or employed a novel conceptual framework to explore ATS use, as in Brown's exploration of masculinity in American methamphetamine users [40]. Moreover, thematic synthesis is deemed appropriate when such variability exists in the richness and 'thickness' of data [87].

Few papers focused on stimulant-based NPS, probably reflecting their relative recency, as well as the challenge of capturing this rapidly shifting area of substance use [88–90]. Further, we found little qualitative evidence exploring users' perspectives on which factors enabling decreased ATS use or longer-term abstinence, although previous systematic reviews have considered the clinical effectiveness of potential interventions for ATS dependency [12,19,20]. Data on environmental shaping of ATS use at potential change points was also scarce. However, users in the included studies often found it challenging to isolate precise points at which levels of use increased or decreased, which could in turn make it difficult to identify external or distal factors contributing to these changes in their drug use pathway.

Several implications for policy and practice emerge from this review. By identifying which factors contribute to specific transitions in an individual's ATS use trajectory, our findings highlight windows of opportunity for intervention, as well as providing contextual information shaping the change points. Such evidence could contribute to more effective targeting of harm reduction and treatment efforts. Based on previous research, we would suggest that there is particular demand for swift and responsive services for adolescent users, where progression from recreational to dependent levels of consumption can occur within a short time-frame [91]. Further, as others have found, high-risk sexual behaviour appears common among ATS users [92], meaning that sex risk reduction measures, such as condom provision and voluntary HIV counselling/testing, are also needed [93,94].

Next, the heterogeneous nature of ATS users suggests the need for treatments and interventions that are tailored to specific subgroups. For example, there are gender differences in the epidemiology, patterns and consequences of substance use, as well as treatment outcomes [95]. We would therefore suggest that future policy builds on positive evidence for the incorporation of gender-specific elements into treatment programmes [95] and the effectiveness of integrated programmes for women with children [96]. Similarly, given that mental health was identified as a common factor contributing to the initiation and escalation of ATS consumption, there is a need to address the mental health needs of users in order to improve treatment outcomes [97].

Lastly, while certain subgroups need tailored intervention packages, our findings also highlight the need for joined-up care from service providers to address users' overlapping health, welfare and social care needs [19,98,99]. There is substantial evidence that drug-dependent individuals are likely to have frequent and often sustained interactions with criminal justice, social service and both primary and secondary health-care systems [100–102], yet policy responses are too often fragmented and uncoordinated [103,104]. Stopping ATS use was reported as particularly challenging, and often required users to extract themselves from former social networks to decrease or cease consumption. We would suggest that therapeutic interventions that help users to accumulate increased social capital, including access to broader social networks, are more likely to support their longer-term transition into abstinence [105].

CONCLUSIONS

The findings from this review underline the heterogeneous nature of ATS users, and the complicated dynamic of individual, social and environmental factors that shape different consumption trajectories. Alongside developing interventions better tailored to the multiple, complex needs of specific user subgroups, future research should explore which factors support reduced consumption or abstinence over the longer term.

Declarations of interest

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